**Roll No. .................**                     **Total No. of Pages : 2**

**Total No. of Questions : 09**

**B.Tech. (ECE) (Sem.–7/8)**
# OPTICAL FIBER COMMUNICATIONS
**Subject Code : EC-404**
**Paper ID : [A0329]**

**Time : 3 Hrs.**                                     **Max. Marks : 60**

**INSTRUCTION TO CANDIDATES :**
1.  **SECTION-A is COMPULSORY.**
2.  **Attempt any FOUR questions from SECTION-B.**
3.  **Attempt any TWO questions from SECTION-C.**

**SECTION-A**          **(10 × 2 = 20 Marks)**

l.  Write briefly :

(a) What is difference between material and waveguide dispersion ?

(b) List the advantages of optical communication.

(c) What is the principle of operation of laser ?

(d) Describe some important modulation formats.

(e) What is stimulated Raman scattering ?

(f) Calculate to express a channel spacing of 0.4 nm in terms of frequency.

(g) What is zero-dispersion wavelength ?

(h) Differentiate conventional and dispersion shifted fibers and dispersion flattened fibers.

(i) Express the difference between 60 dBm and 60 dBm in watts.

(j) What is the source of generation of FWM ?

**SECTION-B**          **(4 × 5 = 20 Marks)**

2.  Discuss various factors considered in the design of optical receiver.

3.  Discuss the SPM and XPM effect in optical fibers.

4. List the desired features of a photodiode. Also give comparison of performance of PIN and APD photodiodes.

5. A LED has 2V applied to its terminals; it draws 100 mA and produces 2 mW of optical power. What is the LED's conversion efficiency from electrical to optical power?

6. Calculate the material dispersion for a wavelength 10 nm below the zero-dispersion wavelength.

## SECTION-C            ($2 \times 10 = 20$ Marks)

7. Discuss the modulation response of laser for large-signal modulation. Also discuss the mode control in tunable lasers.

8. Derive the expression for receiver sensitivity of an APD.

9. Write a note on the following :

(a) Pulse compression through chirping

(b) Non-radiative recombination

(c) Tertiary and quaternary materials for optical sources

**N-994**